

Claims.

- 5 1. Method for manufacturing plungers for medical syringes,  
whereby such a plunger (3) consists of at least two parts,  
namely a longitudinal plunger body (4) made of plastic and  
a piston body (5) provided at the front end of the plunger  
body (4) which consists of a plastic which is softer than  
10 the plastic of the plunger body (4), characterised in that  
such a plunger (3), or at least a part (36) thereof, is  
formed by first manufacturing the piston body (5) and then  
the plunger body (4), or at least a part (37) of this  
plunger body (4), by means of injection moulding, whereby  
15 the plunger body (4), or the above-mentioned part (37)  
thereof, is injected against the piston body (5).
2. Method according to claim 1, characterised in that the  
piston body (5) is formed such that the front side and side  
20 wall thereof are free of any flash lines and/or, such that  
the front side and side wall thereof are free of gate  
points for the plastic.
3. Method according to claim 1 or 2, characterised in that  
25 the piston body (5) and the plunger body (4), or the  
aforesaid part (37) thereof, are connected by the sole  
adhesion between the plastics out of which they are made,  
in particular without any meshing parts, counter drafts or  
the like being realised thereby.

4. Method according to claim 1 or 2, characterised in that at least one inwardly directed part, such as a collar (10), a part defining a counter draft or the like, is formed on the piston body (5), as use is made during the injection moulding of a mould part (12) with a protruding part (25) in which one or several recesses (25A) are laterally provided and/or a protruding part having one side to form the aforesaid counter draft, whereby, as the above-mentioned mould part (12) is removed from the piston body (5), use is made of the elastic flexibility of the material of this piston body (5), in order to pull the protruding part (25) from the formed piston body (5).

5. Method according to any of the preceding claims, characterised in that the plastic for forming the piston body (5) is provided in the mould impression (16) concerned via the back side of the piston body (5) to be formed.

6. Method according to any of the preceding claims, characterised in that the piston body (5) is formed in a first mould impression (16), after which this piston body (5), while it is still being held in the first mould impression (16) or a part thereof is presented to a second mould impression (17) in which the plunger body (4), or the above-mentioned part (37) thereof, is then injected against the piston body (5) by means of injection moulding, whereby mould impressions (16-17) are applied having such a shape that the obtained plunger body (4) or the above-mentioned part (37) thereof, and the piston body (5) are connected to one another thanks to their shape and/or thanks to the adhesion between the plastics.

7. Method according to claim 6, characterised in that, while the plunger body (4) or the above-mentioned part (37) thereof is formed such that it connects to the piston body (5), a subsequent piston body (5) is simultaneously being formed by means of the same nozzle (34) with which the first piston body (5) is realised, but in another mould impression.

8. Method according to any of the preceding claims, characterised in that the piston body (5) is formed in a mould with mould parts (12-13) whose partial surface mainly coincides with the rear side of the piston body (5) to be formed or extends parallel thereto, after which the mould part (12) with the piston body (5) provided in it is presented against mould parts (14-15) in which the plunger body (4) or the aforesaid part (37) thereof is formed.

9. Method according to any of the preceding claims, characterised in that when realising such a plunger (3) or a part (36) thereof, also an accessory is formed which is situated with at least a part thereof on the front side of the piston body (5), and which consists of a material which is different from the material of the piston body (5).

10. Method according to claim 9, characterised in that the material of the accessory consists of a plastic which is harder than the plastic out of which the piston body (5) is formed.

11. Method according to claim 9 or 10, characterised in that the above-mentioned accessory consists of a part (48) which extends frontally from the front side of the piston body (5) and which, when the plunger (3) is situated in the syringe (1), can at least partially penetrate in the outlet (45) of the syringe (1), in order to be able to optimally empty the syringe (1).

12. Method according to any of claims 9 or 10, characterised in that the aforesaid accessory consists of a part which makes it possible to create a passage between the front side and the rear side of the piston body (5) when emptying the syringe (1) in order to prevent the syringe (1) from being re-used.

13. Method according to any of claims 9 to 12, characterised in that the above-mentioned accessory can be made in any of the following shapes:

- as a part made in one piece with the plunger body (4) of the above-mentioned part (37) thereof, and thus formed simultaneously with it during the injection moulding;

- as a separate part provided on the front side of the piston body (5);

- as a separate part provided on the front side of the piston body (5), whereby this part is injected against the material of the piston body (5) after this piston body (5) has been formed.

14. Method according to any of the preceding claims, characterised in that, in the case where only a part (37)

of the plunger body (4) is injected against the piston body (5), this part (37) is made as an insert, which makes it possible to provide for a connection with the rest of the plunger body (4) at a later stage.

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15. Method according to any of the preceding claims, characterised in that, instead of being used for manufacturing plungers (3) with a longitudinal plunger body (4), they are used for manufacturing plungers of the type  
10 which is meant to be used in combination with a drive element, whereby such a plunger then mainly consists of a piston body (5) and a plunger part, whereby this plunger part is fit to co-operate with such a drive element.

15 16. Method for manufacturing plungers for medical syringes comprising at least a piston body (5), characterised in that a part (48) is formed at the height of the piston body (5) which protrudes frontally from the front side of the piston body (5) and which, when the plunger (3) is situated  
20 in the syringe (1), can penetrate at least partially in the outlet (45) of the syringe (1), whereby this part (48) is formed of a material which is different from, and preferably harder than the material of the piston body (5), and whereby the piston body (5) on the one hand and the  
25 aforesaid protruding part (48) on the other hand are injected against one another, whereby the above-mentioned part (48) can either or not be made in one piece with a plunger body (4) belonging to the plunger (3).

30 17. Device for applying the method according to any of claims 1 to 15, characterised in that it at least consists

of a number of mould parts (12-13-14-15) defining at least a first mould impression (16) and a second mould impression (17) for forming the piston body (5) and the plunger body (4) respectively, or a part (37) of the plunger body (4); a  
5 motion mechanism which makes it possible to move the above-mentioned mould parts (12-13-14-15) in relation to one another and to position them differently so that, in a first position, the piston body (5) can be injected, whereas in a second position, the plunger body (4) or the  
10 aforesaid part (37) thereof can be injected against the piston body (5); and injection means to supply the plastic to be injected to the aforesaid mould impressions (12-13-14-15) respectively.

15 18. Device according to claim 17, characterised in that the first mould impression (16) is mainly situated in a single mould part (13) and in that the motion mechanism consists of a mechanism with which said first mould part (13) with the mould impression (16) provided in it can be moved  
20 between at least two positions, namely a first position whereby this mould impression (16) is mainly sealed and is connected to a nozzle (34) for injecting a first plastic on the one hand, and a second position whereby this mould impression (16) connects to the second mould impression  
25 (17) and whereby the latter is connected to a nozzle (35) for injecting a second plastic on the other hand.

19. Device according to claim 18, characterised in that it comprises two or several mould impressions (16) for the  
30 formation of piston bodies (5) which are situated such that one of these mould impressions (16) can work in conjunction

with the first nozzle (34), while another one of these mould impressions (16) is simultaneously being presented to the second mould impression (17), and in that the motion mechanism moves the first mould impressions (16) in such a manner that the first mould impressions (16) are systematically and repeatedly presented to each time the first nozzle (34) and the second mould impression (17).

20. Device according to any of claims 17 to 19, characterised in that the motion mechanism is a rotating indexing mechanism (32), whose axis of rotation (33-33A) has a direction which is different from the direction or directions of movement according to which the mould parts (12-13-14-15) which are required to form the aforesaid mould impressions (16-17) open and close.

21. Device according to any of claims 17 to 20, characterised in that the injection means comprise two nozzles (34-35) for injecting two plastics respectively, and in that both nozzles (34-35) are provided in one and the same mould part or in one and the same whole, consisting of rigidly connected mould parts (12-14).

22. Device according to any of claims 17 to 21, characterised in that the injection means comprise two nozzles (34-35), for injecting two plastics respectively, and in that both nozzles (34-35) open in parallel land areas of the mould parts (12-14) concerned.

23. Device according to any of claims 17 to 22, characterised in that the mould impressions (16-17) are

formed of mould parts (12-13-14-15) which together define three partial surfaces, in other words surfaces whose mould impressions (16-17) open and close, and in that these partial surfaces are mainly situated step-like in relation to each other.

24. Device according to any of claims 17 to 23, characterised in that it consists of a composed mould, which mainly comprises three parts (18-19-20) which can be mutually moved, a first part (18) and a second part (19) respectively which can be put against one another by means of a translation movement, can be moved away from one another respectively, and a third part (20) which can be moved between at least two positions, namely a first position in which this third part (20) at least co-operates with the first part (18) in order to define the first mould impression (16) on the one hand, and a second position in which a third part (20) at least co-operates with the first part (18) as well as the second part (19) in order to define the mould impression (17), such that the latter connects to the part of the plunger (3) formed in the first mould impression (16).

25. Device according to claim 24, characterised in that the third part (20) can be rotated and can also make a translation movement (T3) in relation to the first part (18) and the second part (19) in order to provide for the opening and sealing of the mould impressions (16-17) concerned.



26. Device according to claim 24 or 25, characterised in that the second part (19) and third part (20) are mounted on a common support (22), such that they can be mutually moved, which support can be mutually moved in turn in relation to the first part (18).

27. Syringe for medical purposes, characterised in that it comprises a plunger of which at least a part has been realised according to the method of any of claims 1 to 16.

28. Syringe for medical purposes, comprising at least a cylinder body (2) with an outlet (45) which is formed of a narrowed outlet part (46), as well as a plunger (3) working in conjunction with the cylinder body (2) which is provided with a piston body (5) and a plunger body (4), characterised in that the plunger (3) comprises a part (48) which protrudes frontally from the front side of the piston body (5) and which can penetrate at least partially in the above-mentioned outlet part (46), whereby this part (48) is formed of a material which is different from the material of the piston body (5), and preferably consists of a plastic which is harder than the material out of which the piston body (5) is formed.

29. Syringe according to claim 28, characterised in that the above-mentioned part (48) which protrudes frontally from the front side of the piston body (5) is made according to either of the following two possibilities:

- as a part made in one piece with the plunger body (4) or made in one piece with a part (37) of this plunger body (4);

- as a separate part situated on the piston body (5) .